P2.2 Mastery Quiz: Magnetism

Section A

1. Choose the correct names for the different poles of a bar magnet. [1]

Tick (✓) **one** box.

A. Red and blue ☐

B. Attract and repel ☐

C. North and South ☐

2. Choose the type of force that magnetism is. [1]

Tick (✓) **one** box.

A. Non-contact ☐

B. Contact ☐

C. Gravity ☐

3. Choose the material that is magnetic. [1]

Tick (✓) **one** box.

A. All metals ☐

B. Iron ☐

C. Silver ☐

4. Choose what will happen when two like poles are brought close together. [1]

Tick (✓) **one** box.

A. They will attract ☐

B. They will repel ☐

C. They will attract and repel ☐

5. Choose the piece of equipment used to find the shape of a magnetic field. [1]

Tick (✓) **one** box.

A. An ammeter ☐

B. A compass ☐

C. An electromagnet ☐

6. Choose the best definition of a permanent magnet. [1]

Tick (✓) **one** box.

A. A material that is magnetic all the time ☐

B. A material that becomes magnetic when it is placed in a magnetic field ☐

C. A material whose magnetism can be switched on and off ☐

7. Choose the best definition of an electromagnet. [1]

Tick (✓) **one** box.

A. A magnet that creates electricity ☐

B. A coil of wire with a current flowing through it around an iron core ☐

C. A machine in a scrapyard that can lift cars ☐

8. Choose the option that would increase the strength of an electromagnet. [1]

Tick (✓) **one** box.

A. Removing the iron core ☐

B. Increasing the number of turns in the coil ☐

C. Decreasing the number of turns in the coil ☐

9. A student is investigating the effect of increasing the current on the strength of an electromagnet.

(a) Choose the correct independent variables for this investigation. [1]

Tick (✓) **one** box.

A. Size of battery ☐

B. Strength of electromagnet ☐

C. Current ☐

(b) Choose correct dependent variable for this investigation. [1]

Tick (✓) **one** box.

A. Current ☐

B. Strength of electromagnet ☐

C. Number of turns on the coil ☐

(c) Choose the type of graph that would be most appropriate to present the results of this investigation. [1]

Tick (✓) **one** box.

A. A line graph ☐

B. A bar graph ☐

C. A pie chart ☐



10. Choose the best definition of a magnetic field. [1]

Tick (✓) **one** box.

A. The area where a magnet is magnetic ☐

B. The area where the magnetic poles are ☐

C. The area around a magnet that is affected by the magnetic force ☐

11. Choose the correct direction of magnetic field lines. [1]

Tick (✓) **one** box.

A. From top to bottom ☐

B. From north to south ☐

C. From south to north ☐

12. Choose the option that best explains the cause of the Earth's magnetic field. [1]

Tick (✓) **one** box.

A. There is a giant bar magnet inside the Earth ☐

B. The Earth has a molten core of iron and nickel ☐

C. The Earth has geographic and magnetic poles ☐

13. Choose the statement that is true of the Earth's poles. [1]

Tick (✓) **one** box.

A. The geographic poles are the same as the magnetic poles ☐

B. The geographic poles are at the same place as the magnetic poles ☐

C. The geographic poles are not the same as the magnetic poles ☐

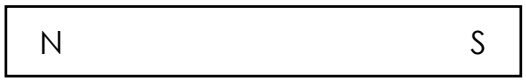
Section B

1. Describe what would happen if you placed two opposite magnetic poles together.

2. Steel is magnetic.

   Explain why steel is magnetic.

3. Complete this diagram by drawing magnetic field lines around this bar magnet.



4. Describe a method that could be used to investigate the effect of increasing the number of turns on a coil on the strength of an electromagnet.

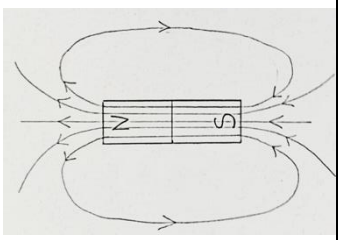
P2.2 Mastery Quiz: Magnetism
Marking Guidance
Section A

Qu	Answer	Marks	Supporting information for fix-it tasks
1	C	1	Answering A suggests a misconception that magnets always have red and blue poles, often caused by the bar magnets used to demonstrate having this feature. *To fix it, show students a magnet where the poles are not red and blue.* Answering B suggests a confusion between the poles and the magnetic forces. *To fix it, reteach the rules that like poles repel and opposite poles attract.*
2	A	1	Answering B suggests that students do not know the difference between contact and non-contact forces. *To fix it, reteach the definitions of contact and non-contact forces with examples.* Answering C suggests the misconception that magnetism is the same as gravity, where objects are attracted to the Earth by magnetism. *To fix it, reteach the differences between magnetism and gravity, showing how gravity is only ever an attractive force but magnetism can be attractive or repulsive.*
3	B	1	Answering A suggests the misconception that all metals are magnetic. *To fix it, reteach the specific metals that are magnetic and explain why steel is also magnetic.* Answering C suggests a confusion between silver and steel. *To fix it, reteach the magnetic metals and explain why steel is magnetic.*
4	B	1	Answering A suggests confusion around the rules for attraction and repulsion. *To fix it, present students with scenarios of different poles and ask them to explain whether attraction or repulsion will occur.* Answering C suggests a misconception that the magnetic force can be both attractive and repulsive at the same time. *To fix it, ask students to state the rules for attraction and repulsion.*
5	B	1	Answering A or B suggests a gap in knowledge about the function of a compass. *To fix it, give students a compass and a magnet and get them to plot the magnetic field.*
6	A	1	Answering B suggests a confusion between permanent magnets and induced magnets.

			To fix it, reteach the difference between permanent and induced magnets. Answering C suggests a confusion between a permanent magnet and an electromagnet. *To fix it, ask students to explain the difference between a permanent magnet and an electromagnet.*
7	B	1	Answering A suggests a misconception that the magnet creates the electricity rather than the current flowing through the wire generating the magnetic field. *To fix it, review the definition of an electromagnet, showing how its magnetism can be switched on and off.* Answering C suggests a confusion between the definition of an electromagnet and a use of an electromagnet. *To fix it, give students further examples of electromagnets in action in other contexts, such as the electric bell.*
8	B	1	Answering A suggests a misconception that the iron core is not necessary for the electromagnet. *To fix it, ask students to state the definition of an electromagnet.* Answering C suggests a confusion around the ways to increase the strength of an electromagnet. *To fix it, reteach the ways to increase and decrease the strength of an electromagnet.*
9a	C	1	Answering A suggests a lack of specificity for the independent variables. Changing the size of the battery may increase the current but this was not the investigative question. *To fix it, give students different investigative questions and ask them to identify the independent variables.* Answering B suggests a gap in understanding of the difference between independent and dependent variables. *To fix it, give students different investigative questions and ask them to identify the independent and dependent variables.*
9b	B	1	Answering A suggests a gap in understanding of the difference between independent and dependent variables. *To fix it, give students different investigative questions and ask them to identify the independent and dependent variables.* Answering C suggests confusion around the different factors that affect the strength of an electromagnet and

			the importance of control variables. *To fix it, ask students to describe some control variables for this investigation.*
9c	A	1	Answering B or C suggests a gap in knowledge of when to use each type of graph or chart. *To fix it, reteach when each type of graph or chart should be used and give students practice identifying the appropriate one to use based on the data being collected.*
10	C	1	Answering A shows a lack of specificity with the definition of a magnetic field. *To fix it, recap the definition of a magnetic field.* Answering B suggests a confusion between the definition of magnetic field and the area where magnetic field is strongest. *To fix it, show students a magnetic field diagram, highlighting that the whole area is the magnetic field, it is just strongest near the poles.*
11	B	1	Answering A suggests confusion around the direction of the field lines which could be due to examples always drawing north at the top and south at the bottom of a magnet. *To fix it, give students a horizontal magnet and ask them to draw the magnetic field lines.* Answering C suggests a gap in knowledge for the direction of magnetic field lines. *To fix it, get students to practice drawing magnetic fields.*
12	B	1	Answering A suggests a misconception that the Earth actually contains a giant bar magnet. *To fix it, review the properties of the Earth's core that makes it behave like a giant bar magnet.* Answering C suggests a gap in knowledge around the cause of Earth's magnetism. *To fix it, reteach the structure of the Earth's core to explain the cause of its magnetism.*
13	C	1	Answering A suggests a misconception that the magnetic poles are the same as the geographic poles. *To fix it, use a diagram to reteach the locations of the Earth's magnetic and geographic poles.* Answering B suggests that students understand that the poles are different but have a gap in knowledge of the location of the magnetic poles. *To fix it, use a diagram to reteach the locations of the Earth's magnetic and geographic poles.*

Section B

Qu	Model answer	Supporting information *Suggestions for fix-it tasks*
1	The opposite poles would attract each other.	A common error is to confuse the magnetic force directions. *To fix it, reteach the definition of like and opposite poles and give students different scenarios where they identify whether poles will attract or repel.*
2	Steel contains (is an alloy of) iron, which is one of the magnetic metals (iron, nickel, cobalt).	Students may struggle to link steel with iron, having understood that there are only three magnetic metals. *To fix it, show students the elements that are found in steel and ask them to identify which is responsible for it being magnetic.*
3	Example:  - Arrows should be pointing from N to S - Lines should not touch or cross - Lines should be closest together at poles	A common error is to label the directions of the magnetic field lines incorrectly or not drawing the lines carefully enough so there are places where they overlap. *To fix it, show students the success criteria for drawing magnetic field lines:* - *Lines run from North to South* - *Lines cannot touch or cross* - *Lines should be closest together at the poles*
4	The independent variable is the number of turns on the coil. The dependent variable is the strength of the electromagnet (measured as the number of paperclips picked up). The control variables would be the current, the size/material of the iron core.	A common error here is not identifying the correct independent and dependent variables. These do not need to be stated specifically but should be inferred from the method. *To fix it, give students a method for this experiment with a*

	1. Connect wires to a power supply. 2. Coil wire around an iron nail x number of times. 3. Attach the wires to the nail using crocodile clips. 4. Switch on the power supply. 5. Hold a paperclip close to the nail until it is attracted and lifted. 6. Repeat until no more paperclips can be lifted and record the maximum number of paperclips that were lifted. 7. Switch of the power supply and repeat the experiment with increasing number of turns in the coil.	*different independent variable and ask students to identify the variables.* Another common error when writing methods is not using clear logical steps. *To fix it, share the success criteria below with students and ask them to rewrite their answer.* **Success criteria:** A good method should: - Include clear, logical, numbered steps - Name any pieces of apparatus or quantities needed - Describe how the dependent variable will be measured - Describe how the independent variable will be changed